

REMARKS

Status of the Claims

Claims pending in the above-identified application are Claims 1-6 and 22-33.

The Rejections Under 35 U.S.C. § 102(b)

Claims 1, 2, 4, 22, 23, 25, 28, 29, and 31 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,778,661 to Avidan et al. (*Avidan*). In view of the above amendments to Claims 1, 22, and 28, Applicants respectfully assert that the rejection is obviated and request this rejection be withdrawn.

The invention as claimed in Claim 1, from which Claims 2 and 4 depend, is directed to an olefin trimerization system for a homogeneous catalyst system. The olefin trimerization system in combination comprises a reactor, first and second inlet lines operably and independently connected into the reactor, a reactor effluent line from the reactor and a separator operably connected to the reactor effluent line. The first inlet line delivers olefin reactant to the reactor. The homogeneous catalyst system is delivered to the reactor via the second inlet line, and the second inlet line is located to provide thorough contact of the olefin reactant and the catalyst in the reactor. Olefin reactant, catalyst and trimerization reaction products are transferred from the reactor via the reactor effluent line. The separator separates desired trimerization reaction products. As claimed in new Claim 22, the reactor is selected from a solution reactor, a slurry reactor, or a gas phase reactor.

The invention as claimed in Claim 22, from which Claims 23 and 25 depend, is directed to an olefin trimerization system. The system in combination comprises a reactor, first and second inlet lines operably and independently connected into the reactor, a reactor effluent line from the reactor and a separator operably connected to the reactor effluent line. The first inlet line delivers olefin reactant to the reactor. Catalyst is delivered to the reactor via the second inlet line, and the second inlet line is located to provide thorough contact of the olefin reactant and the catalyst in the reactor. Olefin reactant, catalyst and trimerization

reaction products are transferred from the reactor via the reactor effluent line. The separator separates desired trimerization reaction products. As claimed in Claim 22, the reactor is selected from a solution reactor, a slurry reactor, or a gas phase reactor. The reactor does not employ a fluidized bed.

The invention as claimed in Claim 28, from which Claims 29 and 31 depend, is directed to an olefin trimerization system. The system in combination comprises a reactor, first and second inlet lines operably and independently connected into the reactor, a reactor effluent line from the reactor and a separator operably connected to the reactor effluent line. The first inlet line delivers olefin reactant to the reactor. Catalyst is delivered to the reactor via the second inlet line, and the second inlet line is located to provide thorough contact of the olefin reactant and the catalyst in the reactor. Olefin reactant, catalyst and trimerization reaction products are transferred from the reactor via the reactor effluent line. The separator separates desired trimerization reaction products. Separation of catalyst from the olefin reactant and the trimerization reaction products occurs after the catalyst, olefin reactant and the trimerization reaction products are discharged from the reactor into the reactor effluent line.

The above-referenced Office Action states that *Avidan* discloses a reactor (2), a first inlet line (23) for olefin reactant, a second inlet line (14) for catalyst, an effluent line (46) from the reactor for transferring olefin, catalyst and reaction products (column 7, lines 23-26) and a separator connected to the effluent line to separate desired products (column 7, lines 29-32). According to the Office Action, the first and second inlet lines are separate from one another and located in the reactor to provide contact within the reactor of the materials they carry (column 6, line 59, through column 7, line 3).

Avidan describes a reaction process using a fluidized bed reactor (see column 2, lines 34-51, and column 6, line 11 and lines 59-60). The invention as claimed in Claim 22 does not. Referring to Figure 1 of *Avidan*, the drawing clearly indicates that line 10 removes catalyst from the reactor. As stated at column 6, lines 44-45, "[t]he system provides for withdrawing catalyst from above grid 8 by conduit means 10." The invention as claimed in

Claim 28 separates catalyst from the olefin reactant and the trimerization reaction products occurs after the catalyst, olefin reactant and the trimerization reaction products are discharged from the reactor into the reactor effluent line. In contrast, at column 7, lines 14-26, *Avidan* states:

A plurality of sequentially connected cyclone separator means 30, 32 and 34 provided with diplegs 36, 38 and 40 respectively are positioned in an upper portion of the reactor vessel comprising dispersed catalyst phase 28.

The product effluent separated from catalyst particles in the cyclone separating system then passes to a plenum chamber 42 before withdrawal via conduit 46, operatively connect[ed] with effluent separation system 50. The product effluent is cooled and separated to recover C5+ liquid hydrocarbons, gaseous recycle or offgas along with any by product water or catalyst fines carried over.

As indicated in Figure 1, catalyst is concentrated at grid 8 as a result of discharge from the cyclone separators. Although *Avidan* indicates that “catalyst fines” may carrier over from the cyclone separators into the effluent line, catalyst fines do not equate to a transfer of the catalyst which is introduced into the reactor. In contrast to the claimed invention, *Avidan* clearly teaches removal of catalyst from the reactor via line 10, the same as a “second effluent line”. Actually, the presence of the cyclone separators and line 10 teach away from the claimed reactor effluent line for transferring olefin reactant, catalyst and trimerization reaction products. Clearly, *Avidan* requires separation of the catalyst from the trimerization reaction products prior to the trimerization reaction products being discharge from the reactor. Thus, by requiring a “second effluent line”, *Avidan* does not teach or suggest Applicants’ claimed combination of elements. Further, as confirmed above, a fluidized bed reactor like *Avidan*’s does not employ a homogeneous catalyst system which is in sharp contrast to the invention as claimed in Claim 1. *Avidan* cannot employ a homogeneous catalyst system and is not an olefin trimerization system for a homogeneous catalyst system and does not teach or suggest such a trimerization system. Accordingly,

Applicants respectfully request that the rejections of Claims 1, 2, 4, 22, 23, 25, 28, 29, and 31 under 35 U.S.C. § 102(b) be withdrawn.

The Rejections Under 35 U.S.C. § 103(a)

Claims 3, 24, and 30 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Avidan* in view of U.S. Patent No. 5,689,028 to Lashier et al. (*Lashier*). In view of the above amendments to Claims 1, 22, and 28, Applicants respectfully assert that this rejection is obviated and request this rejection be withdrawn.

As discussed above, *Avidan* requires a “second effluent line” and does not teach or suggest Applicants’ claimed combination of elements. *Lashier* does not teach or suggest that the reactor is operably connected by separate inlet lines to both a source of catalyst and a source of olefin reactant and that these two inlet lines are so arranged in respect to the reactor that the materials transferred in these lines are thoroughly contacted in the reactor. Further, as indicated in the Office Action, *Lashier* employs a gas phase catalyst system. *Avidan* employs a fluidized bed catalyst system. Accordingly, *Avidan* and *Lashier* are not compatible and one of ordinary skill in the art would not be motivated to employ *Lashier* to supplement the deficiency of *Avidan*. Further, *Avidan* teaches removal of catalyst from the trimerization reaction products prior to discharging the trimerization reaction products from the reactor. Thus, there is no need or desire for a catalyst deactivator to be introduced into the effluent stream of *Avidan*. Still further, *Lashier* fails to teach or suggest the deficiencies of *Avidan* as discussed above. Therefore, for the foregoing reasons, there is no motivation to one of ordinary skill in the art to combine the respective aspects of *Avidan* and *Lashier*. Accordingly, Applicants respectfully request the rejection of Claim 3, 24, and 30 under 35 U.S.C. § 103(a) over *Avidan* in view of *Lashier* be withdrawn.

Claims 5, 26, and 32 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Avidan* in view of U.S. Patent No. 4,788,366 to Harandi et al. (*Harandi*). In view of the above amendments to Claims 1, 22, and 28, Applicants respectfully assert that this rejection is obviated and request this rejection be withdrawn.

The reactor of the claimed invention is operably connected by separate inlet lines to both a source of catalyst and a source of olefin reactant. These two inlet lines are so arranged in respect to the reactor that the materials transferred in the lines are thoroughly contacted in the reactor. As discussed above, *Avidan* requires a "second effluent line" and does not teach or suggest Applicants' claimed combination of elements. *Harandi*, like *Avidan*, is directed to a fluidized bed reactor system. See column 6, lines 15-16. As illustrated in FIG. 2 of *Harandi*, feed inlet line 210 is shown connected to catalyst inlet line 250, thus catalyst inlet line 250 is not separate from the feed inlet line 210. As recited in the rejected claims, the first inlet line for olefin reactant and the second inlet line for catalyst are independent from one another. Further, *Harandi*, like *Avidan*, shows a "second effluent line" or catalyst outlet means 228 in FIG. 2. "Catalyst outlet means 228 is provided for withdrawing catalyst from above bed 224 and passed for catalyst regeneration in vessel 230 via control valve 229." Therefore, *Harandi* fails to supplement the deficiencies of *Avidan*. Thus, neither *Harandi* or *Avidan*, alone or in combination, teach or suggest each and every element of the claimed invention. Accordingly, Applicants respectfully request that the rejection of Claims 5, 26, and 32 under 35 U.S.C. § 103(a) over *Avidan* in view of *Harandi* be withdrawn.

Claims 6, 27, and 33 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Avidan* in view of U.S. Patent No. 5,521,264 to Mehra et al. (*Mehra*). In view of the above amendments to Claims 1, 22, and 28, Applicants respectfully assert that this rejection is obviated and request this rejection be withdrawn.

There is no citation of disclosure in *Mehra* that supplements the deficiency of *Avidan* with respect to the first and second inlet lines and the reactor effluent line of the claimed invention. According to the Office Action, *Mehra* teaches the use of a solvent to absorb ethylene, higher alpha olefin comonomers, and heavier hydrocarbons (col. 13, lines 61-65). However, the discussion in *Mehra* that the Office Action refers to is directed to a vent gas absorption unit and not to a reactor. See column 13, lines 11-13, lines 21-23, and lines 30-32. Specifically, *Mehra* states "[a]n absorption solvent stream 98 is pumped into the

top of the absorber stripper...” See also *Mehra*, FIG. 2. Therefore, there is no teaching or suggestion in *Mehra* or *Avidan* that “the inlet line from the source of catalyst system further comprises a reactor inlet operably connected from a source of trimerization reaction solvent” as claimed in the rejected claims. Thus, *Mehra* fails to supplement the deficiency of *Avidan* and neither *Mehra* nor *Avidan*, either alone or in combination, teach or suggest the claimed invention. Accordingly, Applicants respectfully request the rejection of Claims 6, 27 and 33 under 35 U.S.C. § 103(a) over *Avidan* in view of *Mehra* be withdrawn.

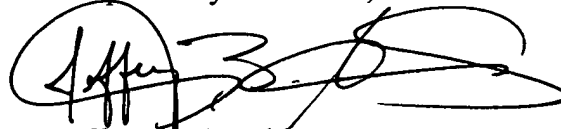
Title: Olefin Production Process
Serial No. 08/951,201
Filed 10/14/97

CONCLUSION

In view of the foregoing remarks, Applicants respectfully assert that the rejection of the claims as set forth in the Office Action have been addressed and overcome. Applicants further respectfully assert that all claims are in condition for allowance and requests that an early notice of allowance be issued. If issues may be resolved through Examiner's Amendment, or clarified in any manner, a call to the undersigned attorney at (404) 745-2461 is respectfully requested.

Please charge any additional fees or credit any overpayment to Deposit Account No. 11-0855.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Jeffery B. Arnold', is written over a circular stamp or seal.

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